CERC Technical Report No. 12

Living with Snow Leopards

A Conservation Education Strategy for the Himalayan High Altitudes

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and
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Trivedi, P., Bhatnagar, Y.V., and Mishra, C. 2006. Living with snow leopards: a conservation education strategy for the Himalayan high altitudes. *CERC Technical Report No. 12*. Nature Conservation Foundation and International Snow Leopard Trust.

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Front cover Snow leopard *Uncia uncia*. Picture by Milan Trykar
Back cover

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ACKNOWLEDGEMENTS

We are grateful to the Whitley Fund for Nature for coming forward to support our research and conservation programme in the Himalayan high altitudes. The Whitley Award has enabled us to initiate conservation education and outreach efforts, and we wish to thank Edward Whitley, Louisa Mitchell, and Georgina Ponder for their support. Special thanks are also due to Brad Rutherford and Tom McCarthy of the International Snow Leopard Trust for their constant encouragement and support. At NCF, we are particularly thankful to our immensely efficient Programme Manager Rakhee Karumbaya for administrative support. Thanks Rakhee, for taking care of almost everything! We also wish to thank our NCF colleagues, in particular Aparajita Datta for stimulating discussions, and R. Raghunath for assistance with mapping. Finally, we would like to thank Sangeetha Trivedi for the creative inputs and very rewarding discussions, Jigish Mehta for help with design and layout of the draft document, and Tsewang Namgail for editing the manuscript at a rather short notice.

SUMMARY

Himalayan ibex

Himalaya, a global biodiversity hotspot, is a unique, rich and fascinating mountain range. With its diverse climatic, physical, altitudinal, floral, faunal and human components, it is undoubtedly the most significant mountain system in the world. The mountain is home to the endangered and almost mythical snow leopard *Uncia uncia*, and a variety of other equally fascinating, albeit less celebrated wildlife. The high altitude wildlife of the Indian Himalaya is rich and diverse, but faces multitudes of threats from a transition that is witnessing rapid changes in the lifestyles of local people and increased pressures on natural resources ultimately driven by market forces. Intensifying conflicts due to livestock depredation by wild carnivores and grazing competition between livestock and wildlife, coupled with lack of awareness and empowerment among local people threaten the snow leopard, its associated species and their natural habitats.

For any conservation intervention to be effective, all the stakeholders from the local communities who depend on and impact the wildlife and natural resources, to the implementing and enforcing agencies of the Government, need to be involved in the process. To direct the development quest in high altitude areas towards a sustainable future, the role of conservation education is crucial. And to make education worthwhile and effective, a strategy to address the existing threats/issues and relevant target groups is needed. Such a strategy needs to be focused, structured, thematic and participatory. The present strategy document has been prepared with this background and need. It is a guiding document that intends to generate widespread awareness and to bring about a positive change in the status of Himalayan wildlife and natural resources.

The aim of the strategy is to communicate through specific messages and educational tools with relevant target groups, the need to conserve the snow leopard, associated wildlife, and their natural high altitude habitats in the Indian Himalaya, thus striving towards long-term ecological, livelihood, aesthetic, economic, spiritual and recreational benefits. The main objectives of the strategy are to (i) identify conservation issues and threats to wildlife in the Himalayan high altitudes, (ii) assess the relative impact of various human institutions and groups on wildlife and natural resources, (iii) assess the potential positive influence of various human institutions and groups on wildlife and natural resources if specific negative behaviours or actions could be addressed through a conservation education programme, (iv) identify educational tools and their messages and content for specific target groups and for specific threats, and (v) provide a framework for monitoring and evaluation through measurable indicators and outcomes.

We used published literature from the studies carried out on the agro-pastoral communities, human-wildlife conflicts and ecology of threatened species of mammals in the Indian high altitudes, and personal observations to generate baseline information. Considerable information was also drawn from the work and experiences of the decade-long high altitude programme of ISLT and NCF with focus on research, community-based conservation, exploration, creation of protected areas and use of science in influencing policy. Based on this, we prepared a list of 13 threats to wildlife conservation, and nine potential target groups for a comprehensive conservation education programme. We ranked this information and generated matrices showing the distribution and intensity of each threat in seven high altitude regions of Indian Himalaya. Lack of awareness, conflicts associated with livestock depredation by wild carnivores, and grazing competition between livestock and wildlife emerged as major threats. We then scored the contribution of each target group to different threats to arrive at relative 'impact scores'. Potential positive impact of these target groups in addressing the threats through educational interventions was also scored as 'influence score'. The impact and influence scores together identified the important target groups to be local people, especially youth, and Government agencies. NGOs and teachers were other target groups of significance. Although children and armed forces scored low on these scales, their contribution to certain threats and potential influence indicated that even these groups are of value in the long-term educational intervention.

After identifying the threats, human institutions impacting them, and those that can potentially best address them through an educational programme, we identified appropriate educational tools for specific threats and target groups.

We propose three types of educational interventions called major programmes, specific actions and link-up actions. Major programmes have three distinct tools viz. the Living Himalaya Campaign (TLHC), Youth Awareness Clubs (YAC) and Children's Environmental Education Programme (CEEP). TLHC would be developed and implemented in collaboration with Government agencies, especially the education and forest departments and intends to include several products and activities. CEEP has been conceived as a continuous programme involving in-school and outdoors activities coordinated by trained teachers and village youth set to develop positive values, feelings and attitudes for wildlife and nature along with increase in knowledge and understanding of the natural environment, and actions to improve it. YAC targets youth and the community at large to initiate awareness generation at local levels, build their capacity and sustain conservation education and action programmes. Training for eco-tourism, nature interpretation, school programmes and community-based conservation programmes would also be given to youth. Special emphasis would be laid on involvement of women in this programme.

Specific actions include several activities/products and actions, which are further categorized into print material, audio-visual and interactive material, outreach products and field activities. We briefly outline the nature and scale of monitoring programmes needed to evaluate the successes and failures of the suggested activities and actions.

Interwoven in the strategy is the essential element of dialogue and discussions with the stakeholders and collaborations and networking with individuals, institutions and NGOs striving towards the same goal of wildlife conservation through human welfare. The strategy emphasizes the use of locally relevant educational tools to promote awareness and empower local communities to participate in conservation efforts and resolve conflicts with wildlife. It also emphasizes the importance of sensitizing the polity, bureaucracy, and the military to secure the future of India's magnificent high altitude wildlife.

INTRODUCTION & BACKGROUND

1. A World on Top of the World
2. The Abode of Snow
3. Methods: Conservation Education Priority Matrices

A WORLD ON TOP OF THE WORLD

1.1 Unique Treasure Trove

Tibetan wild ass

The Himalaya – the highest and the most imposing of the mountain range on earth – is spread over 3,000 km length and 80 to 300 km width across China, Bhutan, India, Pakistan, and Nepal, with associated systems in Myanmar and Afghanistan (see *Figure 1*). In India, this mountain range covers nearly 4,00,000 km2 (c. 12 % of India's geographical area), mainly in the states of Arunachal Pradesh, Sikkim, Uttaranchal, Himachal Pradesh and Jammu and Kashmir. Smaller, relatively lower altitude sections also occur in the states of Haryana, Punjab, Bihar, West Bengal and Nagaland. The altitudinal range varies from c. 300 to c. 8,800 m from the Indo-Gangetic plains to Mount Everest.

The high altitudes of the Himalaya (>3,000 m) measure about 2,50,000 km2 in India. This region harbours a globally significant assemblage of wildlife, which includes large carnivores such as the snow leopard *Uncia uncia*, wolf *Canis lupus*, dhole *Cuon alpinus*, Himalayan brown bear *Ursus arctos*, and Himalayan black bear *Ursus thibetanus*. The snow leopard is amongst the most endangered carnivores of this region. The high altitude mountain ungulate assemblages of the Himalaya are amongst the richest in the world in their species diversity and include wild yak *Bos grunniens*, Kashmir stag or hangul *Cervus elaphus*, musk deer *Moschus* spp. (three species), Himalayan ibex *Capra sibirica*, flare-horned markhor *Capra falconeri*, bharal or blue sheep *Pseudois nayaur*, Ladakh urial *Ovis vignei*, Tibetan argali *Ovis ammon*, kiang or the Tibetan wild ass *Equus kiang*, Tibetan gazelle *Procapra picticaudata*,, Tibetan antelope *Pantholops hodgsoni*, Himalayan tahr *Hemitragus jemlahicus*, takin *Budorcas taxicolor*, serow *Nemorhaedus sumatraensis*, Himalayan goral *N. goral*, Chinese goral *N. caudatus*, and red goral *N. baileyi*. Most of these species have been listed in Schedule I (endangered) of the Indian Wildlife (Protection) Act, 1972. Majority of them have also been assigned various threat categories globally (see Mishra *et al*. 2004b). The entire Himalayan mountain range has now been designated as a global biodiversity hotspot (see Myers *et al*. 2000, CI 2006). The Himalaya has three endemic bird areas (western, central and eastern Himalaya) containing 38 endemic bird species of which 16 are globally threatened (Grimmett *et al*. 1998). Hence, it is of high significance for global avifaunal conservation.

The Himalayan region has also supported indigenous communities and tribes, whose traditional knowledge and production systems have sustained agriculture and pastoralism through ages in the apparently harsh climatic conditions (Mishra 2001). The region also harbours a rich wealth of livestock including domestic yak, several varieties of cattle *B. indicus*, and yak-cattle hybrids in the Western Himalaya, and in addition the mithun *B. frontalis* and its hybrids with cattle and yak in the eastern Himalaya. Other domestic ungulates are goats *C. hircus* (including the *Changra* goat known for its cashmere called pashmina), sheep Ovis aries, horses *E. caballus* (including the well-known *Chumurti* breed), donkeys *E. assinus*, and mules.

1.2 Mountains of Hope

The Himalaya forms a physical barrier against the dry, strong and cold winds from the Tibetan plateau. This barrier also provides security to countries such as India, Nepal and Pakistan, thus being of strategic importance for national security. Himalaya carries an immense religious and spiritual importance for the people of India. The role of the Himalaya in biogeography and climate of India and its subsequent influence on the ecology and economy of the country is immense (see Mani 1974, Schaller 1977). Specifically, its role in the Indian monsoon and concurrent weather patterns is central (Mani 1974). Majority of large rivers of south Asia (such as the Indus, Ganga, Tsangpo/Brahmputra, Yamuna, and Sutlej) arise from the higher Himalaya and the adjoining Tibetan plateau. These rivers support large areas of agriculture downstream and in the plains, thus playing a vital role in the food security of India, Pakistan, Nepal, Bhutan, Bangladesh and Myanmar. The Himalaya is of immense importance for tourism for recreation, pilgrimage, mountaineering, trekking and outdoor education. Agricultural and pastoral communities residing in the high mountains depend on its ecological services and natural resources such as fodder and firewood for their livelihoods.

Himalaya's broad spectrum of resources such as medicinal plants, mushrooms, and ornamental plants form a vital source of mountain livelihoods. This mountain range also offers vast potential for research in geology, geography, botany, zoology, ecology, anthropology, sociology and paleontology.

1.3 Human Societies in Transition

A young Buddhist monk

The rich and unique diversity of the Indian high altitudes is threatened with mounting pressures of an increasing human population, their aspirations and needs of economic development and the concomitant over use and neglect of the region's natural resources. Besides, the mainstream development process is influencing the patterns of farming, transport, communication and market relationships (Ale 2000, Mishra 2000). This has brought about a socio-cultural transition among the communities, leading to a change in the lifestyles and the nature of their impact on wildlife and natural resources, many of which have been negative (Ale 2000).

Today, conflicts between people and wildlife are being reported across the Himalaya (Miller and Jackson 1994, Mishra 1997, Bhatnagar *et al*. 2006a). Amongst the most important threats to carnivores such as the snow leopard, wolf, and dhole, is the persecution by local communities in retaliation against livestock predation by these carnivores (Mishra 1997, Mishra *et al.* 2003, 2006a). Other forms of conflict reported from the higher Himalaya include wildlife damage to crops (Mishra *et al*. 2004b), and perceived conflicts with the kiang over forage (Bhatnagar *et al*. 2006a). Immense pressure on natural resources and the negative ecological impacts of mountaineering, recreational and religous tourism have been documented in the high altitudes (Spaltenberger 2006). Presence of armed forces, ecological destruction due to wars and terrorism have added new global and trans-nation dimensions to the conservation issues. Due to loss of biodiversity and transition from subsistence to market-based economy, traditional ecological knowledge is getting fast eroded.

Non-empowerment of local institutions, lack of awareness among people, and poor implementation of wildlife laws have hampered wildlife conservation in the Himalaya. As wildlife populations are spread across national boundaries, wildlife conservation also requires political and military support, which is still very marginal.

1.4 Beleaguered Wildlife

The Indian Himalaya has recently witnessed one unconfirmed global extinction in the form of the Mountain Quail *Ophrysia superciliosa* – an endemic bird found in the middle Himalayan region. Several local and regional extinctions of bird species, mountain ungulates, large carnivores and possibly lesser vertebrates have taken place (see Mishra *et al*. 2002, 2004b, Rawat and Sathyakumar 2004). The threat of other regional extinctions also looms large with fewer than 100 Tibetan gazelle left in India (Bhatnagar *et al*. 2006b). Of the 14 species of large mammals weighing more than 50 kg in the Trans-Himalaya, 12 species are threatened (Bhatnagar *et al*. 2004). Of the 34 species of mammals reported by Mishra *et al*. (2004b) from the high altitudes of western Arunachal Pradesh, 18 species are included in various threat categories of IUCN, with 12 species being either Vulnerable or Endangered. Rodgers *et al*. (2002) listed several mammal species of the high altitude Himalaya (Tibetan gazelle, Tibetan antelope, Ladakh urial and Tibetan argali) in need of further protection through improved protected area network.

Several medicinal plants have been over-harvested in the Himalaya and face the danger of extinction (Rawat 1994, Kala 2001, 2005), and so do some over exploited tree species such as Juniper (*Juniperus*) and Yew (*Taxus* spp.). Gymnosperms such as *Pinus gerardiana*, *Cedrus deodara*, *Picea brachytyla*, and *Cephalotaxus mannii* are threatened chiefly owing to unsustainable use (TPCG and Kalpavriksh 2005). The genetic diversity of crop plants and domestic animals has eroded in all parts of India including the Himalaya (TPCG and Kalpavriksh 2005). Mishra *et al*. (2004b) documented heavy hunting of mammals in high altitudes of Arunachal Pradesh in the eastern Himalaya. Similar threat has been documented for the Tibetan gazelle in the past, and continuing for species such as the flare-horned markhor, musk deer and, snow leopard (McCarthy and Chapron 2003, Bhatnagar *et al*. 2006b).

1.5 Conservation Education: Its Role and Need

It is apparent that the fragile high altitudes of the Himalaya face a multitude of problems. On the one hand, the demands of human welfare and economic growth imply a strong need for development among the people and the Government. On the other hand, the current nature, scale and rate of development has several negative impacts on wildlife and environment. The geological and ecological fragility of the Himalaya continue to be ignored while meeting development goals. Since the impacts of the developmental process are already showing up across the high altitudes in the form of direct or indirect threats to wildlife and the environment, interventions and efforts aimed at promoting wildlife conservation and ecologically sensitive development are necessary.

Any planned intervention or effort needs to be based on a plan that clearly identifies the issues and threats, spell out a strategy to tackle the threats, identifies the the target groups concerned, and provides a framework for monitoring the impact of the intervention. At the same time, it is not enough to prescribe a set of actions. For any conservation initiative to be effective, all the stakeholders need to be involved in the process. Furthermore, its success will often depend on the support of implementing and enforcing agencies of the Government. In other words, conservation must make sense to all concerned! To achieve this, conservation education is vital.

Conservation education for a variety of stakeholders is pivotal to achieving wildlife conservation in the Himalayan high altitudes. A well thought out and implemented conservation education programme can lead to (i) better empowerment of local communities whose support and involvement is critical for wildlife conservation, (ii) greater awareness amongst rural and urban children who are the future custodians of India's wildlife, and (iii) sensitization of a variety of other conservation stakeholders, authorities, and government departments, whose support is essential to achieve conservation.

To make education worthwhile, interesting, and effective, it needs to be open yet focused; structured yet flexible; thematic yet spontaneous; and directional yet participatory. This strategy aims to facilitate efforts that strive to meet conservation education goals in this manner. It seeks to provide a guiding document aimed at (i) generating widespread but target specific awareness of the importance of conserving Himalayan wildlife and the threats it faces, and (ii) catalyzing change in negative behaviours or actions. We also identify link-up actions to give the strategy the required flexibility. Interwoven in its fabric is the essential element of dialogue and discussions with the stakeholders and collaborations and networking with individuals, institutions and NGOs working towards the same goal. We emphasise the use of locally relevant educational tools to promote awareness and to empower local communities to participate in conservation efforts and resolve conflicts with wildlife. The strategy also underscores the means and ways of sensitizing the polity, bureaucracy, and the military. Finally, we introduce specific monitoring goals and indicators to constantly evaluate and improve conservation education efforts.

1.6 Aim and Objectives

Our broad aim in developing this strategy is to communicate to relevant target groups, the need to conserve the snow leopard, associated wildlife, and their high altitude habitats in the Indian Himalaya, in ways that people can avail their ecological, livelihood, aesthetic, economic, spiritual and recreational benefits. We propose to achieve this through specific messages and educational tools for different target groups. Our specific objectives while developing this conservation education strategy document were:

1. To identify conservation issues and threats to wildlife in the Himalayan high altitudes.
2. To assess the relative impact of various human institutions and groups on wildlife and natural resources.
3. To assess the potential positive influence of various human institutions and groups on wildlife and natural resources if specific negative behaviours or actions could be addressed (or awareness could be improved) through a conservation education programme.
4. To identify educational tools and their messages and content for specific target groups and for specific threats.
5. To provide a framework for monitoring and evaluation through measurable indicators and outcomes

1.7 Structure of the Report

In this chapter, we have briefly introduced the richness, uniqueness, importance and problems of wildlife conservation in the high altitudes of the Indian Himalaya. The following parts of the report are organized into four chapters. Chapter two is a detailed overview of the Himalayan high altitudes in terms of physical, climatic, floral and faunal elements. In Chapter 3, we describe the methods and analyses adopted to evolve the conservation education strategy. Threats and conservation issues in the Himalayan high altitudes, as well as the target groups for conservation education are identified in Chapter 4. In Chapter 5, we outline the communication strategy with associated matrices, and provide brief descriptions of the specific educational tools proposed to address relevant target groups and threats. Finally, in Chapter 6, we provide a synthesis and highlight the main aspects of this conservation education strategy, which we hope will be useful not only for us, but also for various individuals and institutions working to conserve Himalayan wildlife.

THE ABODE OF SNOW

Nowhere in the world can such a diversity of vegetation be seen as in the Himalaya.
- W.J. Hooker (1785-1865), well-known British botanist

2.1 Introduction

The Himalayan mountain range exhibits tremendous diversity of altitudinal, climatic and physical characteristics. These diverse conditions and associated biogeography have given rise to varied floral and faunal communities and human societies. In this chapter, we provide a brief review of the diverse nature of the Himalaya in terms of physical, climatic and biological features. A special section on the Himalayan high altitudes (> 3000 m) introduces the focal landscape of this strategy document.

2.2 Himalaya: The Major Divisions

The Himalayan mountain range is divided across its length as western, central and eastern Himalaya. Its extreme western part, where the Himalaya merges into the Hindu Kush range is also called the northwestern Himalaya. There are four main sections of the Himalaya along its width (Schaller 1977):

- Outer Himalaya or Shivaliks, adjoining the Indo-Gangetic plain with altitudes up to 1,300 m and a width of about 50 km. This range is sometimes fused with the main Himalaya, or separated by flat valleys known as doons.
- Middle Himalaya, a complex system of ridges and valleys seldom exceeding 5,000 m altitude with a width varying from 50 to 100 km. Dhauladhar, Pir Panjal and Mussoorie ranges are examples of mountain ranges located in this zone.
- Inner Himalaya or Great Himalaya, which harbour all the above 8,000-meter peaks of the world; located between the middle Himalaya to south and the Trans-Himalaya and Tibetan plateau to north. The highest peaks in the states of Jammu and Kashmir, Himachal Pradesh, Uttaranchal, Sikkim and Arunachal Pradesh include Mt. Nun (7,135 m), Mt. Shilla (7,026 m), Mt. Nandadevi (7,816 m), Mt. Kanchenjunga (8,586 m) and Mt. Kangto (7,088m) respectively.

- Trans-Himalaya, including ranges and undulating areas mingled with high plateaus to the north of the Great Himalaya. Being located at altitudes varying from 2,200 m to 7,000 m in the rain shadow of the latter, these are also termed the cold desert. These ranges merge into the Tibetan plateau.

2.3 Climatic Gradients and Associated Features

Across the length and width of the Himalaya, there is considerable variation in the rainfall regimes. The rainfall gradient increases from west to east. For instance, Darjeeling has an annual rainfall of 3,200 mm, while Shimla at 1,200 km to its west c. 1,039 mm and Srinagar another 400 km further west receives only c. 724 mm. More dramatic than the horizontal variation and exerting a greater influence on wildlife is the vertical zonation of the Himalaya. So much is the change that in a span of less than 100 kilometers, from a humid rainforest in the eastern Himalaya, one could reach an alpine meadow. This vertical variation in climate has given rise to unique plant and animal assemblages. Plant associations in the Himalaya approximate the function of an altimeter. For instance, in the western Himalaya, what begins with a *Sal* forest in the lowlands and Shivalik hills transforms into Chir Pine *Pinus roxburghii* forest along the slopes and hill crests, giving way to oak (*Quercus* spp.) and blue pine *Pinus longifolia*, changing further with altitude into oak-fir-beach (*Quercus-Abies-Picea*) association to birch (*Betula* spp.) - rhododendron (*Rhododendron* spp.) communities near the tree line. Shrubby growth (*krummholz*) and alpine meadows appear at about 3,600 to 3,900 m in the western Himalaya to 4,200 m in the eastern Himalaya, before merging into snowline at about 5,000 m. This diversity of altitudinal niches and specific microhabitats therein has contributed highly to Himalayan species richness. Geographically, the deep gorges of Sutlej and Kali Gandaki rivers have acted as dispersal barriers.

2.4 High Altitudes of the Himalaya

Areas above 3,000 m altitude are regarded as high altitude areas. The high altitude zone, home of the snow leopard, covers about 2,50,000 km^2 area (ca. 7.5 % of India's land area) in India spread over the Trans-Himalaya, Middle and Greater Himalaya.

Middle and Greater Himalaya: The high altitudes of the Middle and Great Himalaya differ from the Trans-Himalayan region in terms of terrain, vegetation and fauna. The same altitudes in the two areas support different vegetation. Forests and sub-alpine vegetation is found till about 4,000 m in majority of these areas, while in the Trans-Himalayan region the same altitude has sparse steppe vegetation. Several tree species including *Pinus gerardiana, P. wallichiana, Betula utilis*, *Abies pindrow* and *Picea smithiana* are found. Some wild ungulate species are exclusive to this region - Himalayan tahr, flare-horned markhor, takin, hangul and musk deer. Snow leopard occurs in the higher reaches, but in lower areas (below 3,000 m), common leopard is found. Non-Buddhist peasant communities inhabit this region that includes parts of Jammu and Kashmir, Himachal Pradesh (Dhauladhar, Kinnaur), Uttaranchal (Mussoorie), Sikkim and Arunachal Pradesh.

Trans-Himalaya: The Trans-Himalayan region includes Ladakh region in Jammu and Kashmir, Lahul and Spiti in Himachal Pradesh and northern Sikkim, with smaller sections in Uttaranchal (Rodgers *et al*. 2002). Two major zones have been recognized in the Indian Trans-Himalayan region – Ladakh Mountains and Tibetan Plateau (Rodgers and Panwar 1988). The former includes most parts of Ladakh and Lahaul-Spiti with predominantly steep mountains and valleys (altitudinal range 2,200-7,000 m), while the latter consists of rolling mountains, vast plains and high-altitude lakes mostly above 4,200 m in the Changthang region of Ladakh, parts of Spiti, small part of Uttaranchal and the northern plateaus of Sikkim. While the snow leopard is present in both the high altitude regions, wolf occurs only in the latter, as do the wild yak, Himalayan ibex, Ladakh urial, Tibetan argali, kiang, Tibetan gazelle and Tibetan antelope. The vegetation of the Trans-Himalayan region is in the form of dry steppe, generally lacking in tree growth, and composed of species such as *Caragana, Astragallus, Artemisia, Carex, Festuca, Lonicera, Kobresia, Poa, Potentilla, Polygonum* and *Stipa*. (Schaller 1977, Chundawat and Rawat 1994, Mishra 2001).

There is a short (3-4 month) growing season for vegetation when temperatures are conducive. This has given rise to specialized assemblage of flora and fauna, which is adapted to the cold and arid climate (Bhatnagar *et al*. 2004). Most people follow Buddhism in this region.

Table 2.1 Species richness of plants and vertebrates in the Himalaya (CI 2006)

Group	Number of Species	Endemic Species	% Endemism
Plants	10,000	3,160	31.6
Mammals	300	12	4.0
Birds	977	15	1.5
Reptiles	176	48	27.3
Amphibians	105	42	40.0
Freshwater Fishes	269	33	12.3

2.5 Wildlife of the Himalaya

Arunachal macaque

Table 2.1 shows the currently known species richness levels of plants and major vertebrate groups of the Himalayan region. Among all the Himalayan countries, India possesses the highest number of bird species and is only second (after China) in the species richness of all other vertebrate groups (CI 2006). The current estimates of species richness, however, appear to be conservative for all groups. Recent surveys in the region have brought to light new species of amphibians and reptiles (Pawar and Birand 2001) as well as mammals (see Datta *et al*. 2003, Mishra *et al*. 2004b, 2006b, Kumar *et al*. 2005). The recently discovered high altitude Arunachal macaque *Macaca munzala* is a Himalayan primate altogether new to science (Sinha *et al*. 2005). A significant feature of species diversity in the Himalaya is the high degree of endemism. For instance, the number of angiosperm species endemic to the Indian Himalaya is 3,165, which represents about 45 % of the total endemic plant species (about 6,850) in India (ICIMOD 2006).

Tibetan gazelle

2.6 Wildlife of the High Altitudes

The high altitude Himalayan region harbours populations of several globally threatened mammals including the snow leopard, Himalayan brown bear, red panda *Ailurus fulgens*, Asiatic ibex, flare-horned markhor, Himalayan tahr, wild yak, musk deer, takin, serow, and the Tibetan antelope. Chundawat and Rawat (1994) reported nearly 35 species of mammals from the Ladakh region. Mishra *et al.* (2004b) reported 34 mammalian species from the high altitudes of western Arunachal Pradesh. The mountain ungulate assemblage of the region is amongst the richest in the world. Pfister (2004) recorded 310 species of birds in Ladakh. Among these, Black-necked *Crane Grus nigricollis* – a globally threatened species and several other breeding species such as the Bar-headed Goose *Anser anser* assume high conservation significance. Himalaya is also important for conservation of pheasants and their relatives. Three species of amphibians and 11 species of reptiles have been reported from Ladakh (Anon. 2001). The Trans-Himalayan regions of Jammu and Kashmir and Himachal Pradesh have been reported to possess over 750 species of angiosperms (see Chundawat and Rawat 1994), of which several have medicinal properties (Anon. 2001).

METHODS

Conservation Education Priority Matrices

3.1 Introduction

We used published literature and personal observations to identify and analyse the threats/ issues in conservation of the snow leopard and other wildlife of the high altitudes of the Indian Himalaya, and to identify target groups for a comprehensive conservation education programme. Published information from the studies carried out on the agro-pastoral communities, human-wildlife conflicts and ecology of threatened species of mammals in the Indian high altitudes were used (e.g. Saberwal 1996, Mishra 1997, Anon. 2001, Mishra 2001, Bhatnagar *et al.* 2002, McCarthy and Chapron 2003, Bhatnagar *et a*l. 2004, Mishra *et al.* 2004a, Mishra *et al.* 2004b, Bhatnagar *et al*. 2006a and 2006b). Considerable information was drawn from the work and experiences of the decade-long high altitude programme of ISLT and NCF with focus on research, community-based conservation, exploration, creation of protected areas and use of science in influencing policy. Based on this, we prepared a detailed list of threats to wildlife conservation, and potential target groups for the education programme. We then developed the priority matrices for threats and human institutions/groups. Finally, specific and relevant educational tools were identified to address each important threat and each target group.

3.2 Priority Matrices: Relative Severity of Threats and Importance of Target Groups

We listed the major threats to wildlife conservation in the higher Himalaya alongside the various human institutions or groups responsible for each of the threats. We then assigned scores to each threat by each group according to its seriousness (in terms of intensity and extent). The scores were integers on a scale of 0 to –3 where 0 denoted no impact and –3 implied high negative impact, with scores of –1 and –2 showing low and medium impact respectively. This was followed by scoring the potential positive role of each of the human groups on wildlife and natural resources in terms of addressing specific negative behaviours or actions (threats) (or improved awareness) through a conservation education programme.

The scores for this potential positive impact of target groups – called the influence score – were positive integers along a scale of 0 to 3, with 0 denoting no influence and three denoting maximum positive influence. For instance, active intervention by the Government and army could have a positive influence on threat/issues such as trans-boundary wildlife conservation and poaching. Influence score of a group thus reflected its potential in reduction of the threat/issue, (positive), whereas impact score was an indicator of the negative role of the group. Considering both the impact score and the influence score together allows in proper identification of threats and target groups, and in prioritizing conservation actions.

To examine and illustrate the regional differences (and similarities) in threats (and accordingly the specific educational interventions required), we divided the Indian higher Himalaya into seven areas, and listed the important threats to conservation in each of them. These threats were also given scores of 0 to –3 as described earlier, such that the importance of each threat in different regions was brought out. Finally, a matrix was developed that contained relevant educational tools for each threat/issue for important target groups (considering the high impact and influence scores) and their major outcomes, as well as measurable indicators for these interventions.

3.3 Education Tools: Choice and Relevance

The two matrices described above were vital for selection and prioritization of conservation education tools. In deciding the possible educational interventions, we considered the importance of each threat, the human institution/ group responsible it, as well as the potential target groups (influence scores) which could make a difference to the threats. This information was used along with characteristics of each target group to evolve a conservation education response. Take for example the depredation of livestock by wild carnivores, which was an important threat identified by the threat matrix. Local communities including youth were the chief impact groups (see tables 4.1 and 4.2). The immediate need therefore is to target these two groups to bring a change in people’s attitude and provide alternatives. The success of our conservation programmes in Spiti (consisting of livestock insurance scheme, pasture protection and prevention of retaliatory killing; Mishra et al. 2003b) and its recent extension to Ladakh showed that if local people are to be convinced about this, they need to be shown the experiences of other such communities. Hence, a film on livestock insurance programme and its fall-outs that shows the success and people’s experience with it was chosen as the appropriate tool. Meetings and consultations is the other tool to evolve other ideas and create consensus. These two tools would be appropriate for the other two target groups, which could influence the process - Government agencies and NGOs. Using these tools, these two agencies can create more livestock insurance programmes and through meetings/consultations generate more ideas to deal with the threat/ issue.

Matrices were developed showing the relevance of the identified education tools for different threats and target groups, using a similar scoring scale of 0 to 3. All major threats, their major impact and influence groups, relevant educational tools to address these two, major outcome and indicators of success were also tabulated.

RESULTS

4. Pieces of the Puzzle: Threats and Target Groups
5. Putting the Pieces Together: a conservation education strategy
6. Towards a Synthesis

PIECES OF THE PUZZLE

THREATS AND TARGET GROUPS

4.1 Interpreting the Matrices: Analysis of Threat and Target Group Scores

Thirteen threats/issues pertaining to wildlife conservation in the Himalayan high altitudes were identified. The matrix of scores under each threat category for each of the seven high altitude areas of the Indian Himalaya is presented in Table 4.1. Out of 13 threats, eight are present in all the seven regions. These include lack of awareness, livestock depredation by wild carnivores and their retaliatory persecution, grazing competition, socio-economic and cultural transition, hunting and poaching, loss, degradation and fragmentation of natural habitats, crop and forage losses to wild herbivores, and threats due to natural fragility of the Himalaya. In contrast, wars, insurgency and excessive armed force presence emerged as a specific issue only for three of the seven regions.

Based on overall scores, lack of awareness and livestock depredation by wild carnivores showed up as the most important threats/issues, followed by grazing competition between livestock and wild herbivores and socio-economic and cultural transition. Wars, insurgency and excessive armed force presence, threats due to natural fragility of the Himalaya and erosion of indigenous knowledge systems were threats with low overall scores. The other threats/issues had intermediate importance. Assessing region-wise scores, Ladakh had the highest score for the threats/issues followed by the rest of Jammu and Kashmir, Uttaranchal and Arunachal Pradesh. Spiti region showed the lowest threat score. Remaining parts of Himachal Pradesh and Sikkim had intermediate scores. The state of Jammu and Kashmir thus emerged as a state with high threat score.

Based on the relative influence and impact scores (Table 4.2), the most important target groups for a conservation education programme were identified as local people and Government agencies, followed by local youth, tourists and armed forces. The groups with the lowest impact score were children, teachers, general public and NGOs. In terms of influence scores, although the three most important groups remained same, their ranks changed with the order (descending) being Government agencies, local youth and local people.

Table 4.1 Region wise threats/issues for high altitude wildlife conservation in the Indian Himalaya

Threat/Issue of concern	**Spiti**	**Rest HP**	**Ladhakh**	**Rest Jammu and Kashmir**	**Uttaranchal**	**Arunachal**	**Sikkim**	**Total Score**
Lack of awareness	-3	−3	−2	−3	−2	−3	−2	−18
Livestock depredation by wild carnivores	-3	−1	−3	−1	−2	−3	−1	−14
Grazing competition	-2	−2	−3	−2	−2	−1	−2	−14
Socio-economic and cultural transition	-2	−2	−3	−1	−2	−1	−2	−13
Hunting and poaching	-1	−2	−2	−2	−1	−3	−1	−12
Loss, degradation and fragmentation of natural habitats	-1	−2	−2	−2	−2	−2	−1	−12
Over harvesting of medicinal plants	0	−2	−2	−1	−3	−2	−2	−12
Trans-boundary wildlife conservation	0	0	−2	−3	−1	−3	−3	−12
Unsustainable Tourism	-1	−2	−3	−1	−3	−1	−2	−12
Crop and forage losses to wild herbivores	-1	−1	−2	−2	−1	−2	−1	−10
Erosion of indigenous knowledge systems	2	−2	−2	−1	−2	0	−1	−10
Natural fragility of the Himalaya	-1	−2	−2	−1	−2	−1	−1	−10
Wars, insurgency, excessive armed forces	-0	0	−2	−3	0	−1	0	−6
Impact/Influence score	-17	−21	−30	−23	−23	−23	−19	--

Sources: Mishra 1997, Mishra 2001, Bhatnagar et al. *2002, Rawat and Sathyakumar 2002, Sharma and Lachungpa 2002, Mishra* et al. *2004a and 2004b. Bhatnagar* et al. *2006a, Bhatnagar* et al. *2006b*

Table 4.2 Contribution by different target groups to threats to wildlife conservation in the high altitudes of the Indian Himalaya. The table shows the severity of impact (impact score) of each group, and their potential influence (influence score) in addressing the threats/issues (thereby their importance as target groups)

Threat/Issue of concern	**Local people**		**Govt. agencies**		**Tourists**		**Local youth**		**Armed Forces**		**NGOs**		**Teachers**		**General public**		**Children**	
	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b
Lack of awareness	−0	1	0	2	0	0	−1	3	0	1	0	3	0	3	0	0	0	1
Livestock depredation by wild carnivores	−3	3	−1	2	0	0	−2	2	0	0	0	2	0	1	0	0	0	0
Grazing competition	−3	2	0	2	0	0	−1	2	0	0	0	1	0	0	0	0	0	0
Socio-economic and cultural transition	−1	2	−2	2	−2	2	0	3	0	0	−1	2	−1	3	0	0	0	2
Hunting and poaching	−2	2	0	3	−1	2	−1	2	−1	3	0	2	0	2	−1	1	0	1
Loss, degradation and fragmentation of natural habitats	−2	2	−2	2	−2	1	−1	1	−2	2	0	2	0	2	0	1	0	0
Over harvesting of medicinal plants	−2	2	0	2	−1	1	−1	2	0	0	−1	2	0	0	−1	1	0	0
Trans-boundary wildlife conservation	−2	2	−2	3	0	1	−1	1	−2	3	0	2	0	1	0	0	0	0
Unsustainable Tourism	−1	2	−2	2	−3	1	−1	3	0	0	−2	2	0	1	0	1	0	1
Crop and forage losses to wild herbivores	−3	2	−2	2	0	0	−1	2	0	0	0	2	0	0	0	0	0	0
Erosion of indigenous knowledge systems	−1	3	0	1	0	1	−1	3	0	0	0	2	0	3	0	0	0	2
Natural fragility of the Himalaya	−1	1	−2	2	−2	2	0	1	−2	2	0	2	0	1	0	0	0	1
Wars, insurgency, excessive armed forces	−1	1	−3	3	0	1	−2	2	2	1	0	1	0	1	0	1	0	2
Impact/Influence score	**-22**	**25**	**-26**	**28**	**-11**	**12**	**-13**	**27**	**-10**	**12**	**-4**	**25**	**-1**	**18**	**-2**	**5**	**0**	**10**

The letter 'a' denotes impact score, 'b' shows influence score.

NGOs and teachers had intermediate ranks followed by armed forces, tourists, children and general public. It was thus clear that the three most vital groups to be targeted for a conservation education intervention were local people, Government agencies and local youth. However, higher influence scores of NGOs and teachers make them other vital target groups.

4.2 Major Threats/Issues in the High Altitudes

In the present and the following sections, we explain and discuss each of the threats to wildlife conservation in the Himalayan high altitudes, and provide a brief description of each of the target groups of the conservation education programme.

4.2.1 Lack of awareness: McCarthy and Chapron (2003) identified lack of awareness as a major hindrance for snow leopard conservation across its range. In our analysis too, this threat received the highest rank among threats/issues. It is an issue that concerns all the high altitude regions, hence its importance. Awareness about the surrounding environment and conservation issues is relatively low in all sections of the society including children, youth, adults or local governance/ institutions. Therefore, awareness generation would be a major focus for all the potential target groups. However, the nature of intervention required would be different in the seven regions as situation in the Indian high altitudes is variable. For instance, Uttaranchal and to some extent Ladakh has much higher awareness compared to Spiti and Arunachal Pradesh. Since local support and involvement would depend on the level of awareness among local communities and decision-makers, it is imperative that this factor is regarded important for all conservation interventions.

4.2.2 Livestock depredation by wild carnivores: This threat also emerged as one of the most important in terms of its rank among all the 13 threats. In most areas of the Indian high altitudes, there are conflicts between people and large predators such as snow leopard, wolf and dhole due to predation on livestock (Mishra 1997, Mishra *et al.* 2006). These conflicts are intense in many areas, as domestic animals are more abundant than wild ungulate prey and are also more vulnerable to predation by large carnivores due to their evolutionary history (Mishra 1997, Bagchi and Mishra 2006). The dependence of the carnivores on livestock for food can be considerable if the wild prey populations are depleted due to hunting or excessive livestock grazing. Due to high associated economic losses, this conflict between herders and large carnivores often leads to retaliatory killing of these animals by poisoning the carcass or depriving the predators from consuming the quarry, destruction of their litters, or direct hunting (Mishra 1997, Mishra *et al*. 2006).

4.2.3 Grazing competition with livestock: Among, the three most important threats/ issues in the high altitudes, competition between wild and domestic herbivores is a widespread issue. Domestic livestock at high densities often out competes wild herbivores such as the bharal (Mishra *et al*. 2004a) and ibex (Bagchi *et al.* 2002) for food resources. This has led to depletion of wild herbivore populations, and in some cases, caused their local extinctions (Mishra *et al*. 2002, 2004a, Bhatnagar *et al.* 2006b). In addition to this direct threat to several species of mountain ungulates, the depletion of wild prey populations results in intensified predation by wild carnivores on livestock, leading to intensification of conflicts between humans and carnivores. For instance, in the Spiti Valley where livestock outnumbers wild ungulate prey, domestic ungulates make up 40-58 % of the diet of the snow leopard (Bagchi and Mishra 2006). Overstocking of the rangelands is also partially responsible for this competition (Mishra *et al*. 2001). In a sense, threats 4.2.2 and 4.2.3 are linked and manifested as a combined effect.

4.2.4 Socio-economic and cultural transition: Human societies in the Himalayan high altitudes, as elsewhere, are in a state of rapid flux. Many traditional systems, which presumably strived towards lower impacts on resources, including those of voluntary population control and equitable division of resources, are in a process of change (Mishra *et al.* 2003a). Over the last 20-30 years, a transition from subsistence to a market economy has

Tibetan gazelle

taken place in the Himalaya (Mishra 2000). This is mainly been brought about by improved transportation, communication and tourism. Greater integration with regional markets and spread of tourism has increased the demand on natural resources in the high altitudes (Spaltenberger 2006). The newly created opportunities have encouraged immigration of people from the plains (e.g. in Himachal Pradesh, Arunachal Pradesh and Lahaul), thus increasing pressure on the resources. Increasing access to television and other media is also influencing mountain societies. More than eighty per cent of the hill population depends on primary occupations; secondary and tertiary economic activities being rather limited (Gangwar 2002). Reconciling the economic aspirations of local communities while maintaining cultural and biological diversity is a challenge for the conservationists (ICIMOD 2006). Consequent impoverishment of wildlife and natural resources, as well as the erosion of cultural richness are real threats today.

4.2.5 Hunting and poaching: In many high altitude areas such as parts of Ladakh, Himachal Prades and Arunachal Pradesh, hunting and poaching are direct threats to wildlife (see Chundawat and Rawat 1994, Mishra *et al.* 2004b, 2006). This threat is probably the highest in Arunachal Pradesh (see Mishra *et al*. 2004b). The species persecuted in the high altitude areas of this region for subsistence requirements include goral, serow, takin, musk deer, bharal and birds such as pheasants (Mishra *et al.* 2004b). Several large carnivores such as snow leopard and dhole and small carnivores as well as some herbivores are targets due to loss of livestock, trade in their skins or other body parts, crop raiding (macaques) or hunting for sport (Mishra *et al*. 2004b).

4.2.6 Loss, degradation and fragmentation of natural habitats: The effects of loss, degradation and fragmentation of habitats are manifested in the loss of species, reduced benefits of ecosystem services (e.g. freshwater), and an overall impoverishment of the human environment, which may have cultural implications (Norton 1989). Today, the remaining natural habitat in the Himalaya is patchy. The steadily increasing population, high-impact tourism and changing lifestyles of people are leading to extensive loss of natural ecosystems including temperate and sub-alpine forests and pastures (Rawat 2000). Building of roads and consequent improvement in access are accelerating habitat degradation. There is increased demand on the goods and services available from natural ecosystems in the Himalaya. This demand has resulted in unsustainable harvests and loss or degradation of the ecosystems. Rise in the human population, high stocking of domestic animals (Mishra *et al*. 2001), and the influence of markets (Mishra 2000) have been instrumental in this process. McCarthy and Chapron (2003) point to the subtle yet dominant role of (over) grazing by livestock in fragmentation of snow leopard habitats. There are documented and potential factors such as reduced cycles of slash-and-burn farming in the eastern Himalaya, increasing demand of wood due to tourism, use of forests for energy needs of the armed forces and provision of subsidized fuel to people in the high altitudes that have caused heavy loss of forests.

4.2.7 Overharvesting of medicinal plants: It is estimated that about 2,500 species of plants in the Himalaya and 700 species in the Trans-Himalaya are currently used for medicinal purposes (TPCG and Kalpavriksh 2005). In several instances, the demand for medicinal plants and their parts has led to over exploitation and depletion of plant populations (Rawat 2000, Mishra *et al*. 2004b, Kala 2005). Arya (2004) listed nine species as threatened due to over exploitation from the alpine region of Nandadevi Biosphere Reserve, while Kala (2005) listed 60 threatened medicinal plant species (of which 32 were endemic species) from seven protected areas of the high altitude Himalaya. Harvesting these resources unsustainably would imply a fall in income besides leading to negative impacts on the plant and animal communities.

4.2.8 Trans-boundary wildlife conservation: Most high altitude areas of Indian Himalaya fall along the international borders with China (Tibet), Pakistan, Nepal and Bhutan. Owing to contiguous habitats on both sides of the border, but presence of armed forces and physical barriers, conservation of wildlife needs trans-national cooperation. Creating protected areas on both the sides helps maintain contiguity, provide protection to wildlife and prevent the trade in wildlife across international borders. The Kanchenjunga Conservation Area of Nepal and Kanchendzonga National Park of India are examples of such trans-boundary protected areas, which are crucial for threatened species. Conservation of the flare-horned markhor is a case in point that requires a trans-boundary effort along the line of control between India and Pakistan.

4.2.9 Unsustainable tourism: The entire Himalayan region attracts a variety of tourists

Table 4.3 Growth of Tourism in parts of Jammu and Kashmir
(Ministry of Home Affairs 2006)

Year	**Number of tourists**				
	Ladakh			**Vaishnodevi**	**Amarnath**
Domestic	Foreign	Total	Total	Total	Total
1996	3,537	13,036	16,573	43,35,532	1,20,000
1997	2,991	12,810	15,801	44,34,233	79,035
1998	6,792	15,238	22,030	46,22,097	1,49,920
1999	1,735	6,495	8,230	43,16,639	1,10,345
2000	5627	11583	17210	49,40,664	1,73,334

such as trekkers, mountaineers, pilgrims, nature lovers and people interested in recreation. Tourism has seen a phenomenal growth across the Himalaya, especially at the hill stations and places of pilgrimage (see Table 4.3). Better road network, infrastructure and communication facilities have played a pivotal role in boosting this high revenue industry. In particular, the high-end tourists visiting the Himalaya, the large number of vehicles and the small period during which this pressure is concentrated call for some intervention and alternative thinking. There are three important factors, which have not been adequately addressed while developing the tourism sector – assessment of the carrying capacity of the sites for tourists, considerations of ecological impact of tourists and measures to reduce them, and efforts to ensure more benefits to the local communities.

The impacts of increasing tourism are often seen as unplanned and environmentally unfriendly construction of infrastructure and facilities, overuse of natural resources, deforestation, degradation of water sources and decline in quality of water, deforestation, solid waste accumulation and erosion of the local cultural milieu (Spaltenberger 2006). Mountaineers and trekkers often leave large quantities of garbage, consume natural biomass for their energy needs and cause erosion and vegetation degradation along the trails (see Spaltenberger 2006). The socio-cultural impacts of tourism include social divides and hostility towards certain ethnic groups (apparent beneficiaries) as in case of Sherpas in Nepal, drug addiction among youth and erosion of customs and cultural practices (Spaltenberger 2006).

4.2.10 Crop and forage loss due to wild herbivores: Apart from livestock depredation by wild carnivores, crop damage by primates and wild herbivores, and perceived forage depletion by wild herbivores from the pastures represent other forms of human-wildlife conflicts in the high altitudes (Bhatnagar *et al*. 2006a, Mishra *et al*. 2006). These conflicts are serious locally (e.g. Ladakh, western Arunachal Pradesh), but have not reached alarming proportions on a regional scale.

4.2.11 Erosion of indigenous knowledge systems: The communities inhabiting mountains have evolved several indigenous methods and tools that made their lifestyles sustainable. One such example is the use of risk mediation strategies in farming and livestock grazing (see Mishra *et al*. 2003a). There are many examples of such practices where thoughtful rotation of crops and use of existing landscape features to maximize production provided sustained benefits. It is also interesting that many mountain communities ensured the controlled use and equitable distribution of common property resources through local traditional institutions. These systems of ecological, social and economic wisdom of generations today are threatened due to external pressures of development and market economy.

4.2.12 Natural fragility of the Himalaya: Himalaya is geodynamically active and ecologically sensitive owing to its tectonic restlessness, its continuing uplift and resultant structural and physiographical changes. The major natural threats to the wildlife and people in the mountain range include seismic hazards (earthquakes), soil erosion (and land slides), drying up of springs and reduced stream discharge. Four major earthquakes have occurred in the Himalayan region in the past 100 years (Gangwar 2002). In the cold deserts and high altitude areas, avalanches also cause loss to the natural and human environment. They also bring changes in landform. A relatively recent but important threat is global climate change and associated changes such as melting and retreat of glaciers and its impacts on the people and wildlife living downstream. As discussed earlier, the problems are increasing due to unplanned expansion of towns and unsound construction of houses and tourist infrastructure in the higher altitudes. Extensive road networks being created undermine the seismic and erosion parameters. Other important threats include the construction of large dams, expansion of farming on steep slopes, and overstocking of rangelands, cultivation extends to about 3,500-4,500 m in the northwestern Himalaya, while livestock grazing is present even at altitudes of 5,000 m. Overgrazing by domestic animals creates adverse impacts on the soil and vegetation.

4.2.13 Wars, political unrest and insurgency: The Himalaya is spread across six countries and owing to the international borders of these countries (especially India, China and Pakistan), there is a huge concentration of armed forces. Their resource requirements, especially of fuel impose a danger on the Himalayan ecosystems. The wars in Afghanistan (see McCarthy and Chapron 2003, Mishra and Fitzherbert 2004) and between India and Pakistan, and India and China (Bhatnagar *et al.* 2006a, 2006b) have caused damage to habitats and populations of endangered species. Insurgency in the eastern Himalaya within the Indian Territory also has negative ecological impacts. Since 1996, local unrest in Nepal has led to a reduction in tourism-based revenue (see Spaltenberger 2006) with a negative impact on the economy.

4.3 Specific Threats in the Trans-Himalaya

Bhatnagar *et al.* (2004) listed eight major conservation problems in the Indian trans-Himalaya. These include inadequate size of protected areas, occurrence of wildlife outside the protected areas including endangered species such as Tibetan gazelle, grazing competition between wild and domestic herbivores, livestock depredation by wild carnivores, crop and forage losses to wild herbivores, poaching, wildlife diseases and political issues including lack of trans-boundary wildlife conservation initiatives and unrest among local people. Barring the first and the last problem, the rest concern the interface of wildlife with local communities. For instance, Mishra (1997) estimated about 12 % livestock losses to depredation by carnivores in the Spiti valley of Himachal Pradesh. Mishra *et al*. (2001) also reported overstocking of livestock and out-competition of wild ungulates (Mishra *et al*. 2002, 2004a) by livestock in the Spiti region of the Indian trans-Himalaya. Development in the Ladakh region, which includes expansion of human settlements in remote areas, is depriving several wild mammals such as Kiang *Equus kiang*, Ladakh urial, and Tibetan gazelle (Bhatnagar *et al.* 2006a and 2006b) of their foraging grounds. Crop raiding by wild herbivores such as kiang has been reported in Ladakh (Bhatnagar *et al*. 2006a). This has led to conflict with pastoralists with whose livestock they presumably compete for forage in the high altitude valleys. Increasing tourism poses a threat in Ladakh and parts of Himachal Pradesh and Uttaranchal. Increasing road network in the Changthang region as well as the high altitudes of western Arunachal Pradesh are examples of the likely negative impacts of this activity.

4.4 Overview of the Target Groups

4.4.1 Local people: This target group is the most directly linked group (primary stakeholders) benefiting from and affected by the human-natural resource interface in the high altitudes of the Indian Himalaya. It is also the group that is in direct and continuous contact with the habitat and wildlife of the region. Local people as a target group showed the highest impact score and a high influence score, indicating their potential in addressing the threats/issues. This group is diverse in terms of cultural and ecological outlook and is at various stages of economic development. The nature of impact of this group on natural resources also varies from degradation of pastures and forage competition to hunting and over harvesting of medicinal plants. There is also a great variation in the ongoing awareness and educational interventions. Parts of Ladakh, Uttaranchal and to some extent Sikkim have a fair presence of NGOs and educational initiatives, while Arunachal Pradesh lacks such efforts almost completely. In Arunachal, it has been observed that the local population is either unaware about the fallouts of adjacent protected areas or against it (Datta 2006.). In such a situation, the communication strategy needs to address the existing stage of human-nature interface. The most important behaviors that need to be addressed include hunting (for meat and in retaliation against damage to livestock and crops) and poaching (for trade) and unsustainable harvesting of resources (medicinal plants). Behaviors that would be useful include religious and traditional taboos and other socio-cultural systems.
Religious institutions could also play an important role in awareness generation and wildlife conservation. The Buddhist monasteries and priests (*lamas*) form an important section of the local people and need to be considered for influencing all sections of the local communities in most parts of the Trans-Himalaya.

4.4.2 Government agencies: Local bodies of governance such as Ladakh Autonomous Hill Development Council (LAHDC), village *panchayats* and *gram sabhas* (councils), state forest departments and decision makers at other levels though neither dependent directly or indirectly on the local environmental resources, play an important role in the ongoing and future developmental activities. That is why our analysis of target groups indicated a low impact score but a high influence score for Government agencies. Awareness and involvement of various sectors of the local, State and central Governments are important for conservation education interventions. Many sections of the Government would form important target audiences. Protected area managers and staff form a vital section of this target group with respect to capacity building for nature interpretation and for promoting harmonious relationship with local communities. Sharing of experiences and learning from officers and local staff who have served for long-term in the region would benefit conservation strategies and implementation process. Departments of education, social welfare, youth and cultural activities would be of high relevance for our programmes and activities. Local people who have served in the government would be key individuals for support and assistance in implementation.

4.4.3 Youth: Youth comprise about 30 % of the world population (UNEP/DEWA/ Earthwatch 1996-2006). This is also the most physically able and vibrant group of the population. Our analysis of impact and influence scores showed that local youth featured prominently in both, especially the influence rank. Hence, this group is of high importance for awareness and education activities. In the Himalayan high altitudes, this group includes two main sections i.e. rural youth (self employed, employed and unemployed but not attended college) and college students. It is envisaged that the youth would be targets for awareness creation as well as for orientation and training to prepare future educators and environmentally sensitive citizens.

Considering the crucial role that women play in mountain societies, it is imperative that involvement of young women in all the programmes and activities is critical. Their leadership skills and organising abilities could be directed to strengthen village level institutions and conservation efforts, and to initiate local enterprises. Women in general, are more sensitive to environmental issues and would be important for passing on such values and feelings to children. Thus, among youth, women's involvement would be critical for the conservation education initiative.

4.4.4 Local and regional NGOs: As local and regional representatives of people, NGOs play an important role in bringing about social and environmental change. Locally run NGOs are important due to their face-to-face contact with the local communities (especially youth) as well as higher acceptability by people. Further, they form an important link to help surmount the language barrier. In addition, such organizations provide the necessary human resource for awareness and education programmes. NGOs emerged as an important target group due to their high influence score. As target groups for capacity building, partnerships and sustained local level inputs, NGOs are indispensable. As mentioned earlier, several NGOs are active in some of the high altitude areas. One example is Students' Environmental Cultural Movement of Ladakh (SECMOL). Collaborating with such NGOs to learn from their experience, join hands to strengthen the ongoing initiatives and building their capacity could be pivotal.

4.4.5 Teachers: The single most influence on a child, other than that of her parents and elder siblings is of her teacher. Teachers also play an important role by being a part of the youth target group. Teachers connect the formal and informal sectors of education as they bring with them the hidden curriculum and their own outlook and world-view. Our analysis gave a high influence score for teachers as a target group. Since most children go to school in regions such as Spiti, teachers could be a vital link to reach children and their parents. Identifying, orienting and training capable and committed teachers and molding others to play the role of catalysts in spreading awareness would be an important component of the overall strategy for conservation education and outreach.

4.4.6 Armed forces (Army): Since most of the high altitude areas (particularly the trans-Himalayan region) are located near or along the international borders shared by Pakistan, Nepal, China, Bhutan and Myanmar, involvement of armed forces (specifically army) is essential to success of any initiative of this kind. With their high technical and physical capabilities and significant presence in the high altitude areas, the armed forces are a potentially important group for protecting wildlife and their habitats in regions where other agencies would find it difficult to operate. However, this can happen only when this group is aware of the problems and status of wildlife conservation as well as the existing legal framework for protection of wildlife. Besides, for better protection of threatened species in the trans-boundary regions and protected areas, their involvement would be imperative.

4.4.7 Tourists and Tourism Operators: Tourism is a growing sector worldwide and the Himalayan mountain range with its beauty and uniqueness has been attracting tourists, pilgrims, trekkers, mountaineers and spiritual seekers in large numbers. In its present context, much of the tourism in the Himalaya is uncontrolled and unsustainable (see Spaltenberger 2006). The high altitudes being particularly fragile, call for greater care in such activities. A large part of tourism here falls in the category of recreation and mountaineering, which have a high negative impact on the local ecology and socio-cultural milieu. In most cases, neither is the tourist aware nor are the operators about the sustainability or impacts of this activity. Besides, local people are only a marginal or small part of this industry. Most tourist destinations of the Himalaya lie between 2,000 and 3,000 m. In the Trans-Himalayan tract, tourism is present as high as 4,500 m (i.e. in Ladakh and Spiti). Impacts of mountaineering go even beyond this altitude. These areas have witnessed drying up of water sources, deforestation and accumulation of solid waste for which there are no disposal or treatment facilities. Hence, tourists and tourism operators need to be targeted for creating awareness about their impacts and guided to eco-tourism options.

4.4.8 Children: Children form a crucial target group as the future custodians of wildlife, and constitute up to 50 % of the population in many developing countries (UNEP/DEWA/Earthwatch 1996-2006). Although children as a target group did not figure prominently in terms of influence score, their role in the region as future citizens cannot be underestimated. Value building occurs mainly at an early age and incorporating some messages of conservation from childhood would certainly go a long way. There is a need to strengthen the traditional ecological values and environmentally sustainable socio-cultural practices among children of the Himalayan region. Further, to understand the link between the natural environment and their lifestyle, as well as to reduce their impact on the environment, a long-term education programme with local perspective needs to be undertaken. This will prepare the next generation of local people with an outlook on ecologically sustainable development. Efforts need to be made to carry out awareness drives in the schools of the capitals and some smaller cities/towns of the five Himalayan states. Children in regions other than the Himalaya should also be targeted to impart knowledge and create awareness about the ecological role and importance of the Himalaya and its wildlife.

4.4.9 General Public: The spiritual, religious, ecological and economic significance of the Himalaya is of relevance for the entire Indian sub-continent. In fact, Himalaya is a global treasure and creating awareness about its richness, importance and conservation becomes a priority at a global scale as much as at the local level. People living in the sub-Himalayan tracts as well as those farming the rich alluvial plains of the rivers originating from this mountain range need to understand the ecological importance of the Himalaya with regards to the impact of human activities on its status. Children and youth not residing in the Himalayan region also need to be targeted for awareness generation.

PUTTING THE PIECES TOGETHER

A CONSERVATION EDUCATION STRATEGY

5.1 Introduction

Against the background and results obtained in the previous chapters, we employed the following approaches in developing the strategy presented in this chapter:

1. Focus on local level awareness generation and capacity building through long-term programmes. Expand the programmes later to other areas to widen the reach.

2. Target negative behaviours (e.g. hunting, over harvesting of resources) with specific educational interventions and alternatives to ease the problem in a participatory and voluntary manner.

3. Motivate people to conserve wildlife through protection, rotational use of natural resources, enterprise, non-consumptive sharing (e.g. eco-tourism), proactive intervention and restoration (e.g. grazing-free areas), use of indigenous knowledge (e.g. ecologically sensitive farming practices), human-wildlife conflict resolution and institution building/ strengthening at local & regional levels.

4. Influence the bureaucracy, decision-makers and polity to create favourable conditions for wildlife and natural resource conservation. Involve other NGOs and individuals through networking, collaboration, support and capacity building to achieve the goal.

5. Design and conduct activities to raise awareness among general public, especially children in other regions of India as well as other parts of the world about snow leopard and its associated wildlife, their ecology, status and conservation issues in the Himalaya.

5.2 The Educator's Tool-kit

From the analyses carried out in the previous chapter (Tables 4.1 and 4.2), it is clear that some among the 13 threats identified need more attention due to their presence in all regions and high total scores. Similarly, among the target groups, there were some which were of higher significance as they impacted many threats and/or had a high potential to bring about positive change. This information was crucial for considering educational intervention. Accordingly, the strategy needed to emphasise on the educational interventions for some of the important threats and target groups. Hence, this strategy intends to address specific threats/issues for relevant target groups and broad level awareness generation for major target groups through three main types of interventions: major programmes, specific actions and link-up activities. Major programmes are long-term, sustained interventions aimed at awareness generation among major target groups. These would also provide the backbone for several other activities by their sustained and continuous nature. Specific actions encompass a range of activities and products envisaging specific outcomes. Link-up activities are activities/products that provide opportunities to tie up with other similar actions/projects. Education tools identified and their relevance for different target groups have been presented in Table 5.1. Conservation education activities have been further broken up based on the nature of output as major programmes, print material, audio-visual products, field activities and outreach material.

When we assess the scores for each target group in Table 5.1, it becomes clear that the higher score for target groups such as the Government agencies, local youth, NGOs, local people and teachers reflects the prioritization matrix of target groups (see Table 4.2). Further, analysis of relevance of educational tools for different target groups showed that the tools under the Living Himalaya Campaign had higher scores, indicating their versatility. On the other hand, specific activities such as training workshops had low scores. Apart from the Living Himalaya tools, the posters on hunting, threatened species, website, outreach material, information booklet on project snow leopard, nature trails and nature camps showed high scores (Table 5.1). The important messages/contents of the entire education matrix have been outlined in Table 5.2.

5.3 Major Programmes

These programmes were conceived with a view to reach the important target groups and address associated threats. There are three major programmes planned of which two apply to the most important target groups viz. local youth and Government agencies. These programmes – The Living Himalaya Campaign (TLHC) and Youth Awareness Clubs (YAC) – intend to target, motivate and get support of the Government agencies and youth, the two crucial groups in terms of their potential influence for conservation education. From these two groups the outcomes would spread to other target groups such as local people, NGOs, teachers,

Table 5.1. Conservation education tools for different target groups and their scores expressing the relevance of these tools.

No.	Product/Activity	Scores for relevance of education tools for target groups #									
		Local people	Govt. Dept.	NGOs	Local youth	Teachers	Armed forces	Children	Tourists	General public	Total score (tool)
	Print Material										
1.	Poster set -Living Himalaya	1	3	3	1	3	3	3	1	3	**21**
2.	Eco-tourist Guidebook	0	2	2	1	0	0	0	0	0	**5**
3.	Poster(s)-Threatened species	1	3	3	2	3	3	3	2	2	**22**
4.	Poster-No hunting appeal	3	3	2	2	1	3	1	2	0	**17**
5.	Book-Snow leopard	1	0	1	1	3	0	3	2	2	**13**
6.	Workbook- My environment	0	3	2	1	2	0	3	0	0	**11**
7.	Manual for workbook and activities	0	3	2	3	3	0	0	0	0	**11**
8.	Nature Guide manual	2	2	2	3	0	0	0	0	0	**9**
9.	Desk-top card on Tibetan Gazelle	1	2	1	1	1	2	0	1	0	**9**
10.	Booklet on Project Snow Leopard	2	3	3	2	1	2	0	1	2	**16**
11.	Brochure – High altitude programme	0	1	1	0	0	1	0	1	1	**5**
12.	Articles in print media	1	2	1	0	1	2	1	2	3	**13**
13.	Field Guide - common high altitude plants and animals	2	2	2	2	2	1	2	3	0	**16**
	Audio-visual & Interactive material										
14.	Slide show on Living Himalaya	2	3	2	2	3	2	3	2	2	**21**
15.	Film: conserving with communities	3	2	3	2	1	0	0	0	1	**12**
16.	Film: The Living Himalaya	3	3	3	3	3	3	3	3	3	**27**

# Score of 3 indicates high relevance, of 0 shows no relevance, scores of 1 and 2 indicate low and medium relevance respectively.

** Since many products are part of the programmes, programmes have not been ranked separately.*

Table 5.1. Conservation education tools for different target groups and their scores expressing the relevance of these tools.

No.	Product/Activity	Scores for relevance of education tools for target groups #									
		Local people	Govt. Dept.	NGOs	Local youth	Teachers	Armed forces	Children	Tourists	General public	Total score (tool)
17.	Website	1	2	2	0	2	1	2	3	3	**16**
18.	CD-Rom	0	2	2	1	3	1	2	2	2	**15**
19.	Interpretation Centres/Exhibits	2	0	1	1	1	1	3	3	0	**12**
20.	Outreach material	1	1	2	1	1	2	2	3	3	**16**
	Field Activities										
21.	Distribution workshops for book	0	0	1	0	3	0	0	0	0	**4**
22.	Meetings/consultation (using PRA, APPA)	3	1	1	2	0	0	0	0	0	**7**
23.	Training workshops on eco-tourism, EE in schools, colleges	2	2	2	3	3	0	0	0	0	**12**
24.	Nature trails	2	1	1	2	3	0	3	3	0	**15**
25.	Nature Education Camps	1	1	2	2	3	0	3	3	0	**15**
26.	Research on education needs & attitudinal surveys	3	3	1	2	2	1	2	1	0	**15**
	Total Score (Target group)	**37**	**50**	**49**	**40**	**48**	**28**	**39**	**38**	**27**	
	Major Programmes *										
1.	Youth Awareness Clubs	3	1	2	3	2	0	1	1	0	--
2.	The Living Himalaya Campaign	3	3	3	3	3	2	3	3	3	--
3.	Children's Environmental Education Programme	1	2	2	1	3	0	3	0	0	--
		7	**6**	**7**	**7**	**8**	**2**	**7**	**4**	**3**	--

# Score of 3 indicates high relevance, of 0 shows no relevance, scores of 1 and 2 indicate low and medium relevance respectively.

** Since many products are part of the programmes, programmes have not been ranked separately.*

children and armed forces, which have varied importance for conservation education. The third is a long-term awareness and education programme aimed at children to communicate the diversity, importance, status and relevance of high altitude wildlife and their natural habitats in the Himalaya. This programme would aim at developing their understanding, awareness and attitudes for future.

5.3.1 The Living Himalaya Campaign (TLHC): This would form the major awareness campaign for the target groups within the Himalayan region as well as other regions. This campaign is being conceived as a collaborative programme with the Governments of the five high altitude Himalayan states. Since Government agencies form a crucial influence group for countering several threats to high altitude wildlife, this campaign will be co-ordinated with them. Forest departments and education departments of the respective state Governments would play a potential role in partially funding, distributing and using the products and activities brought out as part of the campaign. Among major activities to be undertaken in this programme, the most important would be a series of films on the biodiversity of the Himalaya (including the ways in which it is used and degraded, its status and future). The films would mainly be used for screening in villages, tourist destinations including interpretation centers of protected areas in the Himalaya and interior schools and colleges of the five Himalayan states. A slide show kit on the same theme with information material for each slide for educators would also be developed for distribution and sale to schools and colleges. The slide show would be used for awareness generation mainly in secondary schools and colleges in urban centers. A series of posters depicting the biodiversity of the high altitude Himalaya, its food web, ecological importance and threats it faces, would be prepared for distribution and sale. The film, slide show and poster set would also be distributed/marketed as a set to educational institutions, NGOs and Government Departments. An exclusive ‘Living Himalaya Interpretation Centre’ (or two – one for western and the other for eastern Himalaya) would be conceived and developed in association with respective state Governments and other organisations. More activities and events to be included under the campaign would be explored through consultations with the Governments and included as the process gives more experience and learning.

5.3.2 Youth Awareness Clubs (YAC) – Youth as an important target group and a force for change is a highly dynamic component of the society. To mobilize this human resource, village level/village-cluster level youth environment awareness clubs would be formed. These clubs would carry out ecologically meaningful and sustainable actions such as restoration, assisting in research and monitoring, training and capacity building. An important activity would be training and involvement of youth in running community based conservation programmes. YAC would become the extension arms for long-term awareness and community-based conservation at village level. Through youth and with their capacity building and help, the local people would be addressed. YAC would also be messengers for creating environmental awareness in other areas. They would work in close consultation with other village people and form the focus for village level awareness activities. Youth activity centers would be developed in each village where constructive environmental activities are planned and carried out. Such centers would develop village/regional interpretation facilities, eco-tourism infrastructure, libraries and village development material. These clubs would be encouraged to manage and run eco-tourism activities with guidance on developing nature trails, interpretation along these trails, other specific nature/outdoor education activities and wildlife monitoring. This would require preparation of training manuals, which would be undertaken as per the need. A major outcome of YAC would be development of village-level teams of motivated youth for supporting and undertaking conservation work.

5.3.3 Children's Environmental Education Programme (CEEP) – Mainly aimed at local school children as well as those who do not attend school, this programme would aim to create a generation of ecologically aware and sensitive citizens. Trained local youth and village elders in co-operation with schools and teachers would implement this programme. Through various in-school and outdoor activities, this programme would focus on age group 10 to 15 years. Training of teachers and capacity building of local youth would form an integral component of this programme. An annual calendar of 8 to 10 activities (later to be transformed into a parallel curriculum) would be made with equal weight on outdoor components. Familiarity with local flora and fauna, its use (traditional), status and commercial demand would be communicated through activities and games. Developing a feeling of belonging to their natural environment and being at ease with its vagaries as well as getting excited about its wonders would be included as part of the learning process. Nature trails and nature education camps would be vital tools for communicating specific messages of diversity, status and conservation of flora and fauna in their surroundings. Experience and knowledge of village elders would be drawn to make a workbook for children on local flora and fauna, where in they will record their observations and learning. A workbook – My Environment – would be made for the children. They would record their observations, learning and experiences in the workbook. A manual including directions on conducting various activities and using the workbook to teach children along with other print material would be distributed to teachers and youth involved in CEEP. Training workshops would also be conducted to orient and train them in the use of outdoors and manuals. A storybook on the Snow leopard narrating its relationship with its physical and biological environment (in English and Hindi languages) will be developed and would be a major resource for teaching children in the five Himalayan states. Special distribution and training workshops would be organized to orient the teachers in using it to teach about the Himalayan environment in various subjects. Besides, efforts would be made to target children in all parts of the country in general to raise awareness about issues concerning conservation of high altitude biodiversity in the Himalaya.

5.4 Specific Actions

The material to be developed under this category would aim at specific threats/ issues and major target groups involved. A brief description of some of these activities has been given below. Table 5.2 shows important threats, their relevant target groups, and important educational tools.

5.4.1 Audio-visual/Interactive Material: A website on the snow leopard and associated biodiversity of the Himalaya and other aspects of relevance would be made to create awareness about the richness of biodiversity, its imperiled status and need for conservation. It would have special sections for children. A CD-Rom would also be developed along similar lines. A film on conservation with communities in Spiti and Ladakh, being implemented by NCF-ISLT, would be made to spread the message of success of unique livestock insurance programmes and voluntary closure of village pastures for livestock and improvement in conditions for wildlife. This film would be used as a tool to create support for such schemes elsewhere in the Himalaya where human-wildlife conflict is high. It is likely that after witnessing the success and happiness of other people, more communities would initiate such practices and programmes. Efforts would be made to develop interpretation centers in protected areas or other important locations in collaboration with the state forest departments and other agencies. Use of local material, expertise and technology

Table 5.2. Educational tools for major threat/issue and relevant target groups

Threat/issue	**Major target groups**	**Major educational tools**
Lack of awareness	1. Government agencies 2. Teachers 3. NGOs 4. Local youth	1. Living Himalaya Campaign 2. Children's EE programme3. Youth Awareness Clubs4. Nature Camps/workshops5. CD-Rom
Livestock depredation by wild carnivores	1. Local people 2. Local youth3. Govt. agencies	1. Film: Conservation with communities2. Meetings / consultations
Grazing competition	1. Local people, youth 2. Migratory herdsmen3. Govt. agencies	1. Meetings/consultations2. Film on conservation with communities3. Research on education needs
Socio-economic and cultural transition	1. Local youth/people2. NGOs3. Teachers	1. Meetings/consultations (PRA, APPA)2. Street plays3. Film: The Living Himalaya
Hunting and poaching	1. Government agencies2. Armed forces3. Local people4. NGOs	1. No hunting poster2. Poster(s)–threatened species 3. Meetings/ consultations4. Articles in print media
Loss, degradation & fragmentation		
of natural habitats	1. Local people2. Government agencies3. Armed Forces4. NGOs	1. Living Himalaya – film, posters & slide show2. CD-rom3. Website
Over harvesting of medicinal plants	1. Local people & youth2. NGOs3. Govt. agencies	1. Threatened species poster2. YAC3. Meetings/consultations
Unsustainable Tourism	1. Tourists2. Local people/youth3. NGOs4. Government agencies	1. Eco-tourist handbook2. Nature Guide training & manual3. Nature camps4. Field guide5. Interpretation centres
Crop/forage losses to wild herbivores	1. Local people/youth 2. Government agencies3. NGOs	1. Meetings/consultations2. Film: conservation with communities3. Research on education needs
Erosion of indigenous knowledge systems	1. Local people2. Local youth3. Teachers	1. Children's EE programme2. Youth Awareness Clubs3. Street plays4. Educator's manual/resource book
Natural fragility of the Himalaya	1. Tourists2. Local people3. Armed forces4. Government agencies5. NGOs	1. Living Himalaya – film, posters & slide show2. Web-site3. CD-Rom4. Interpretation Centres5. Nature Camps/ Trails

would be encouraged and linkages with tourism and other sectors would also be created to enhance the use of such facilities. For active interpretation, nature trails would be developed in highly visited select protected areas so that tourists can be made aware of the site's ecological features. Possibilities to contribute the text and for interpretation centers being designed by other organizations would also be explored.

5.4.2 Print Material: The products in this category would include educative poster series on threatened biodiversity of the Himalaya (a set of posters with focus on snow leopard, other mammals, birds and plants) and desk-top cards/calendars for endangered species such as the Tibetan gazelle would be made and distributed to the relevant target groups such as the Army and enforcing agencies such as the State Forest Department. A guidebook for eco-tourists (in the form of a rich & pictorial coffee-table book) and a manual for nature guides would address the issues of negative impacts of tourism and focus on eco-tourism. The former would focus on different tourism routes for wildlife viewing and suggest itineraries. The latter would help local youth and Government guides to interpret nature in an interesting, joyful and interactive manner. A field guide to common high altitude wildlife covering over 200 species of mammals, birds, insects and plants would be brought out. This would have a user-friendly format and be handy to carry. Local language versions may also be developed. A poster based on the appeal of no hunting made by His Holiness the Dalai Lama would be used to create awareness about the religious, legal and ethical aspects of hunting threatened species.

5.4.3 Outreach Products: For communicating the scope and extent of the work of high altitude Himalayan programme of ISLT/NCF, brochures and booklets would be made which could be used for diverse target groups such as armed forces, bureaucrats, NGOs etc. To reach general public, tourists and spread the message of conservation, outreach products such as t-shirts, key rings, caps carrying pictures and message about high altitude wildlife would be developed. Interpretation centers, reception centers of protected areas, tourism spots and eco-friendly resorts would be vital sites for dissemination and sale of outreach material. Field staff of NCF/ISLT would also play a role in this work, so would the youth environment clubs. Coverage of various aspects of the high altitude programme in media would be of immense help and efforts would be made to develop contacts to get wider coverage for the work carried out under this programme. Articles in newspapers and magazines would be a key component of outreach effort. Success of community-based conservation programmes and research findings of NCF-ISLT work in the high altitudes would be presented in popular language. Interesting facets of high altitude wildlife and people would also be brought out in these articles.

5.4.4 Field Activities: These activities would target various groups and address a variety of threats. Besides conducting some of the activities for the primary target groups, these would be useful for several other secondary target groups. Nature trails and nature education camps would be important first-hand exposure tools for children, youth and teachers. These would foster a deeper understanding of links between humans and nature and nurture positive values, feelings and attitudes about wildlife and nature. These tools would also be used for students of schools and colleges of other regions of the country, teachers, Government officials, media persons etc. Two other sets of activities would also be a part of field level work. These include research and monitoring and training workshops.

5.4.5 Research and Monitoring: Since knowledge about the specific educational needs of various target groups from all parts of the high altitudes is not adequate, research on this aspect would be carried out. Questionnaire surveys and observations as well as meetings and consultations with communities and individuals would be used to generate information on aspects linked to awareness and attitudes of the communities towards wildlife and linkages among the factors of high altitude environment. Networking with researchers of the high altitude programme and those of other organizations would be solicited to increase the knowledge base. A dynamic monitoring component for all the educational and awareness interventions would be designed. Table 5.2 provides a matrix of education tools for major threats/issues and a monitoring framework with their anticipated outcomes and measurable indicators. This would help in determining success as well as charting future course of action.

5.4.6 Training Manuals/Modules: Training manuals and modules need to be developed for various target groups such as youth (educators, nature guides), teachers, tourism operators, and NGOs. These would be used for various training workshops and capacity building activities. Both these tools could also be shared and/or marketed. Eco-tourism and nature interpretation would be the chief themes for these products. Through these tools, we would assist other agencies such as Government and NGOs in developing educational products and programmes.

5.5 Monitoring the Progress

Monitoring of educational interventions is essential to assess their successes and failures and to modify/sustain/improve the ongoing actions. After selecting the educational tools to address the major threats and target groups, we tabulated a set of anticipated outcomes and measurable indicators that would assist in monitoring the progress of the interventions (see Table 5.3). Most of these indicators would need baselines for assessing progress. These baselines are available in some cases and for others we would need to establish baselines. For instance, information on the health of pastures vis-à-vis populations of livestock and wild ungulates is available for past few years. But, in instances such as attitudinal changes, we need to create baselines before we start the interventions. Although at present, the monitoring framework is rather limited, we would elaborate the monitoring frameworks to assess the impacts of the programmes/products and future requirements.

5.6 Building Capacity and Partnerships

It is obvious that reaching such a large number of target groups in an effective manner would require a tremendous effort. With our limited resources and capacity, collaborations and networking with other NGOs, Government and individuals; drawing from success stories of others would enhance our efforts and prevent duplication. At the same time, opportunities need to be created for our own capacity building in terms of programme planning, implementation and monitoring. Building a team to carry out education and awareness activities (mainly consisting of local people) would be the key in terms of long-term inputs. In this regard, identification and training of members of the local community and NGOs, who can run the activities would be useful for sustained implementation of the conservation education plan.

It is also of importance to enhance capacities of individuals, NGOs, institutions and Government agencies involved in similar work in the high altitudes. Institutions such as The Mountain Institute (TMI), Centre for Environment Education (CEE), Wildlife Institute of India (WII), GB Pant Institute and NGOs such as Ladakh Ecological Development Group (LEDeG), Students' Educational and Cultural Movement of Ladakh (SECMOL), and several other local organisations are potential partners for education and awareness work in the high altitudes. Government bodies such as the Ladakh Autonomous Hill Development Council (LAHDC), state Forest Departments, Ministry of Human Resources and Department of Science and Technology of the Government of India would be the prime agencies for collaboration, support and capacity building. The knowledge of existing initiatives of the five State Governments (with high altitude Himalayan areas) in conservation education and awareness activities would be gained and potential for collaboration as well as new ideas would be discussed. Private tourism operators, adventure and environment education agencies would form important groups for networking. Efforts to create these partnerships and screening other potential collaborators would be an important part of this strategy. It will be important to create complimentary roles for projects and activities with the collaborators and partners. Exploring funding sources and partners for supporting the initiatives suggested under this strategy would be needed.

5.7 Project Snow Leopard: A Sustainable Future

Project snow leopard, conceived by the Nature Conservation Foundation and International Snow Leopard Trust aims to safegueard India's unique natural heritage of high altitude wildlife populations and their habitats by promoting conservation through participatory policies and actions. It is in the phase of planning and discussion with the state and central governments, and is likely to be launched in the year 2007 in the five Himalayan states in snow leopard range in India. All the state level consultations have been completed and with the five states endorsing it, now the project awaits national consultation. Linkages between the activities and programmes planned under the present strategy and under Project Snow Leopard would be made. Particularly relevant would be education and awareness measures undertaken with respect to conflict resolution in terms of livestock depredation, retaliatory killing of carnivores and grazing competition. Enhancement of protected area interpretation system and creating awareness among communities living in and around the protected areas would also be of relevance for the strategy.

Table 5.3 Monitoring framework for educational tools with anticipated outcomes and measurable indicators

Threat/issue	Major target groups	Major educational tools	Anticipated outcomes	Measurable indicators
Lack of awareness	1. Government agencies 2. Teachers 3. NGOs 4. Local youth	1. Living Himalaya Campaign 2. Children's EE programme 3. Youth Awareness Clubs (YAC) 4. Nature Camps/workshops 5. CD-Rom 6. Website 7. Nature trails	1. Awareness generation 2. Formation of nature clubs in schools 3. YAC in many villages - motivated youth 4. Partnerships/collaboration between Govt., NGOs and local people	1. Increase in wildlife populations 2. Reduction in negative impacts/conflicts 3. Number of nature clubs formed 4. Number of YAC in the region 5. More programmes in the area of wildlife-people interface 6. Increased knowledge among youth & children about the environment
Livestock depredation by wild carnivores	1. Local people 2. Local youth 3. Govt. agencies	1. Film: Conservation with communities 2. Meetings / consultations	1. Understanding and awareness about livestock insurance, better herding and legal provisions for hunting 2. Participatory solution seeking	1. No. of households/villages involved in livestock insurance and pasture protection 2. New ideas to solve the conflict 3. Increased tolerance (change in attitudes)
Grazing competition	1. Local people, youth 2. Migratory herdsmen 3. Govt. agencies	1.Meetings/consultations 2. Film-conservation with communities 3. Research on education needs	1. Awareness about overstocking and pasture health 2. Reduced damage to pastures 3. Creation of grazing-free areas	1. Increase in number / size of protected pastures 2. Reduction / no increase in livestock numbers
Socio-economic and cultural transition	1. Local people / youth 2. NGOs 3. Teachers	1. Meetings / consultations (PRA, APPA) 2. Street plays, fairs 3. Film:The Living Himalaya 4. YAC	1. Initiatives to maintain traditions which have ecological values 2. Commercial enterprises on a co-operative basis 3. Village-centred development	1. Identification of relevant cultural practices lost 2. Wealth distribution and social status 3. Documenting revival of useful & relevant cultural practices
Hunting and poaching	1. Government agencies 2. Armed forces 3. Local people 4. NGOs	1. No hunting poster 2. Poster(s)– threatened species 3. Meetings/consultations 4. Articles in print media	1. Knowledge about species, distribution and status to enforcement agencies 2. Awareness about legal & moral aspects of hunting 3. Sympathy for wildlife	1. Local people's involvement in prevention of hunting 2. Better enforcement - feedback 3. Increase in wildlife populations.
Loss, degradation & fragmentation of natural habitats	1. Local people 2. Government agencies 3. Armed Forces 4. NGOs	1. Living Himalaya – film, posters & slide show 2. CD-rom 3. Website	1. Awareness about the ecological role and relevance of Himalaya 2. Proactive and ameliorative Govt. action	1. Status of the commons 2. Restoration of degraded habitats 3. Declaration of PA s

Table 5.3 Monitoring framework for educational tools with anticipated outcomes and measurable indicators

Threat/issue	**Major target groups**	**Major educational tools**	**Anticipated outcomes**	**Measurable indicators**
Over harvesting of medicinal plants	1. Local people & youth 2. NGOs 3. Govt. agencies	1. Threatened species poster 2. YAC 3. Meetings / consultations	1. Awareness generation 2. Better harvesting practices 3. Locally evolved regulations and rules for harvest	1. Local institution building, village empowerment 2. Improved status of threatened plants
Unsustainable Tourism	1. Tourists 2. Local people/youth 3. NGOs 4. Government agencies	1. Eco-tourist handbook 2. Nature Guide training & manual 3. Nature camps / trails 4. Field guide 5. Interpretation centres	1. Awareness generation 2. Sustainable tourism with local people's involvement 3. Better value for money, but reduced ecological impact	1. Local level tourism development, cash flow 2. Distribution of tourist load, healthy tourist spots 3. Changed attitude and satisfaction among tourists
Crop/forage losses to wild herbivores	1. Local people/youth 2. Government agencies 3. NGOs	1.Meetings / consultations 2. Film: Conservation with communities 3. Research on education needs	1. Understanding of problems & evolving alternate solutions 2. Awareness generation 3. Compensation schemes	1. Increased tolerance (change in attitudes) 2. Reduced retaliation 3. Reduced economic loss
Trans-boundary conservation	1. Armed forces 2. Govt. agencies 3. Local youth	1. Threatened species posters 2. The living Himalaya Campaign 3. No hunting poster 4. Meetings / consultations 5. Articles in media	1. Awareness and concensus building 2. Proactive role of army	1. Improvement in status of wildlife at borders 2. Trans-boundary PA s, peace zones
Erosion of indigenous knowledge systems	1. Local people 2. Local youth 3. Teachers	1. Children's EE programme 2. Youth Awareness Clubs 3. Street plays 4. Educator's manual/ resource book	1. Documentation of indigenous knowledge and system 2. Active use of indigenous knowledge 3. Awareness about importance of indigenous practices	1. Local biodiversity register development 2. Spread of this knowledge through NGOs and Govt. agencies 3. Sharing of knowledge and using it for village upliftment
Natural fragility of the Himalaya	1. Tourists 2. Local people 3. Armed forces 4. Government agencies 5. NGOs	1. Living Himalaya – film, posters & slide show 2. Web-site 3. CD-Rom 4. Interpretation Centres 5. Nature Camps/Trails 6. Eco-tourist handbook	1. Awareness generation about faulty practices 2. Better practices in farming, tourism, development actions	1. Guidelines for development in the Himalaya 2. Restoration projects 3. Changed practices of tourism operators/campers etc.

TOWARDS A SYNTHESIS

6.1 Looking Back

In the preceding discussions, we attempted to develop an educational response to address the threats and issues facing wildlife conservation in the high altitudes of Indian Himalaya. The aim of the strategy is to communicate through specific messages and educational tools with relevant target groups, the need to conserve the snow leopard, associated wildlife, and their high altitude habitats in the Indian Himalaya in ways that people can avail its ecological, livelihood, aesthetic, economic, spiritual and recreational benefits. The main objectives of the strategy were:

- To identify conservation issues and threats to wildlife in the Himalayan high altitudes.
- To assess the relative impact of various human institutions and groups on wildlife and natural resources.
- To assess the potential positive influence of various human institutions and groups on wildlife and natural resources if specific negative behaviours or actions could be addressed (or awareness could be improved) through a conservation education programme.
- To identify educational tools and their messages and content for specific target groups and for specific threats.
- To provide a framework for monitoring and evaluation through measurable indicators and outcomes

6.2 Assembling the Pieces

After describing the general features, uniqueness, significance and ecological problems of the Himalayan high altitudes in the first two chapters, we analysed the distribution and intensity of threats for the seven regions of the Indian high altitudes using a combination of objective and subjective scoring matrices. Issues such as the lack of awareness, livestock depredation by wild carnivores and grazing competition between livestock and wild ungulates emerged as major threats concerning high altitude wildlife. For each of the 13 threats, we also analysed relevant target groups that pose or impact the threats and which could have a positive influence in terms of targets for conservation education. A similar scoring matrix was used for this analysis. The results showed that of the nine target groups identified, local people, especially youth and Government agencies are important in terms of their impact and influence scores. Other less important yet significant target groups were NGOs and teachers owing to their high influence scores.

6.3 The Complete Picture

Based on this information, we explored and considered relevant educational tools to address the threats and relevant target groups. These tools were then organised in a coherent educational framework to formulate the strategy, which had the following approaches:

- Focus on local level awareness generation and capacity building through long-term programmes. Expand the programmes later to other areas to widen the reach.
- Target negative behaviours (e.g. hunting, over harvesting of resources) with specific educational interventions and alternatives to ease the problem in a participatory and voluntary manner.
- Motivate people to conserve wildlife through protection, rotational use of natural resources, enterprise, non-consumptive sharing (e.g. eco-tourism), proactive intervention and restoration (e.g. grazing-free areas), use of indigenous knowledge (e.g. ecologically sensitive farming practices), human-wildlife conflict resolution and institution building/ strengthening at local & regional levels.
- Influence the bureaucracy, decision-makers and polity to create favourable conditions for wildlife and natural resource conservation. Involve other NGOs and individuals through networking, collaboration, support and capacity building to achieve the goal.
- Design and conduct activities to raise awareness among general public, especially children in other regions of India as well as other parts of the world about snow leopard and its associated wildlife, their ecology, status and conservation issues in the Himalaya.

The conservation education strategy, which we proposed had the following features:

1. We suggested three types of educational interventions – long-term and continuous awareness interventions called major programmes, specific actions which target discrete threats and target groups, and link-up actions which provide the dynamism to evolve activities/products to suit other existing or upcoming

conservation education initiatives.

2. Major programmes had three distinct interventions viz. the Living Himalaya Campaign (TLHC), Youth Awareness Clubs (YAC) and Children's Environmental Education Programme (CEEP).

3. TLHC would be developed and implemented in collaboration with Government agencies, especially the education and forest departments and intends to develop and use films, slide shows and posters on the theme "the Living Himalaya". Many other activities and products would be developed and used to communicate with various target groups.

4. CEEP has been conceived as a continuous programme involving in-school and outdoors activities coordinated by trained teachers and village youth set to develop positive values, feelings and attitudes for wildlife and nature. Increase in knowledge and understanding of the natural environment and actions to improve it would also be a part of this initiative.

5. YAC targets youth and the community at large to initiate awareness generation at local levels, build their capacity and sustain conservation education and action programmes. Training for eco-tourism, nature interpretation, school programmes and community-based conservation programmes would also be given to youth. Special emphasis would be laid on involvement of women in this programme.

6. Specific actions included several activities/products and actions, which were further categorized into print material, audio-visual and interactive material, outreach products and field activities. Examples include posters to communicate no hunting messages, a set of posters on threatened species, film on conservation with communities, nature education camps, nature trails, training workshops for eco-tourism, field guide on high altitude flora and fauna and research on educational needs, people's attitudes and impacts of the interventions.

7. Building capacity and partnerships, link-up with Project Snow Leopard and evaluation and monitoring of the suggested actions through a set of anticipated outcomes and measurable indicators also formed a part of the strategy.

We hope that this strategy can be effectively implemented, and will generate awareness among all target groups, address the threats to wildlife conservation in India's high altitudes. We also hope to establish monitoring programmes that can evaluate the success, and perhaps more importantly, the failures of the interventions, and that can allow for constant course corrections. The first major evaluation of the education strategy should be after five years. This would show us the future directions to take and the changes required to achieve better results. Ultimately, the strategy should achieve its goal of improving the conditions for both the wildlife and the people of India's magnificent highlands.

6.4 Limitations and Future

In this short section, we wish to point out the important limitations of our work. Research on human society and wildlife ecology in the Indian high altitudes is limited, and variable between regions. We would like to acknowledge the consequent subjectivity in assigning the scores in the matrices, which, owing largely to lack the of adequate baseline information, is heavily influenced by our own experiences and work. In particular, the data on threats, target groups and conflicts as well as long-term species/ecosystem studies was largely based on studies in Spiti, Ladakh and parts of Arunachal Pradesh. There is less information in our report from Sikkim, greater part of Jammu and Kashmir, parts of Himachal Pradesh other than Spiti and central Arunachal Pradesh. We have also not outlined monitoring protocols in detail, but have mentioned some measurable indicators for some of the interventions. Finally, a near complete lack of thematic, structured and outcome-oriented educational interventions prevented us to draw from proven examples and experiences of previous work in the high altitudes. The document therefore should be viewed only as first step and one that would evolve as more information gets available.

Nevertheless, the broad and guiding nature of the document offsets some shortcomings in terms of data and perspectives. There is considerable scope for improving what we have put together. In the meanwhile, we hope that several of the suggested interventions can be implemented to promote awareness as well as to generate feedback to improve the strategy. We would also look forward to other such efforts and their results that would help improve this strategy.

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APPENDIX I

Conservation education tools and their message/contents

No.	Communication Tools	Message/Content
1	Articles in print media	Various conservation issues/options, accounts of biodiversity, traditional ecological knowledge - stories
2	Book on Snow Leopard (in English & Hindi)	Ecology of snow leopard and its associated species including interactions with humans, status and future
3	Booklet - Project Snow Leopard	Background and overview of the project, its main aims and important aspects of conservation
4	Brochure - High Altitude Programme	Highlight the scope and achievements of the programme
5	CD-Rom	Similar contents as website, but more information
6	Desk-top card	Illustrated card with message for conservation of Tibetan gazelle and information on its distribution, habitat, status and threats
7	Distribution workshops for Snow Leopard Book	Orientation to aims of the book, its use as a tool in including teaching EE in other subjects such as geography & science
8	Eco-tourist Guidebook	Introduction to the Himalaya, important spots for eco-tourists, their biodiversity, do's and don'ts for eco-tourists
9	Field Guide to common high altitude plants & animals	Introduction to the Himalaya and their high altitude biodiversity, pictures/illustrated (preferably by local artists), local relevance of biodiversity and suggestions for better viewing, experiences in the wilderness
10	Film on community-based conservation	Risk mediation and benefits through livestock insurance scheme, protecting wildlife through designating grazing-free areas, preventing retaliatory killing of carnivores and dissemination of the Spiti model to motivate people in other high altitude areas to adopt the same
11	Films on The Living Himalaya	Himalayan uplift, fragility & changes, habitats, flora & fauna, threats and conservation issues
12	Interpretation Centres/Exhibits	One/two focusing on The Living Himalaya theme at highly visited tourist spots, more can be in protected areas with their specific biodiversity themes
13	Meetings and consultations	Documentation of local knowledge on biodiversity of the area, assessment of resource use, understanding of problems and needs, discussion of issues of concern, formation of committees etc.

Conservation education tools and their message/contents

No.	Communication Tools	Message/Content
14	Nature Education Camps	Orientation to natural environments of the high altitudes, knowledge of flora and fauna, understanding of their interrelationships and human dependence, impacts on nature, , developmental issues & activities, development of positive values, feelings, attitudes and behaviours about nature
15	Nature trails	Using the work book to document and grasp the natural environment
16	Nature Guide Manual	Nature interpretation, developing and conducting nature trails, observing wildlife, basic ethics, safety, crisis management
17	Outreach products	Specific messages on threatened species, general theme of Himalaya, biodiversity conservation
18	Poster-Living Himalaya	3 posters with themes of biodiversity of Himalaya, Himalayan high altitude food web and importance of and threats to the Himalaya
19	Poster on threatened species of mammals, birds and plants found in the high altitudes	Information on species range & habitat, status, threats and legal provisions
20	Poster on appeal for stopping retaliatory hunting / poaching	Religious basis for not poaching and value of life, importance of ecosystem integrity
21	Research on education needs and monitoring	Attitudes towards wildlife and damage caused by it, pre & post knowledge tests, needs analysis, traditional value systems, awareness about local/global environmental issues & attitudes towards these, assessment of impact of activities/programmes
22	Slide show on the Living Himalaya	Himalayan environment its physical features, rich and threatened biodiversity, conservation issues & what you can do
23	Training Workshops for eco-tourism, nature guide & other skills	How to conduct trails with nature interpretation and basic ethics, safety training & carrying capacity, Teaching about environment to children
24	Website	Information on the Himalaya – physical features, flora, fauna, threatened species, conservation issues, photo gallery, you & the Himalaya, children's section with pictures, games, quiz etc.
25	Workbook - My environment	To record observations, learning and experiences, identification and traditional uses of plants and animals, impacts of human action, status of wildlife, relevant developmental issues, interviews with village elders, meetings with Govt. officials, Army personnel etc.
26	Manual for Educators	Description of workbook activities and directions on conducting these activities & using the workbook to teach children, other resource material